CLAIMS

1. 1. Apparatus for formatting data change requests in a peer-to-peer, activity-based
2. collaboration system having at least two collaborating computers, each with a
3. local copy of data thereon and wherein the collaborating computers exchange
4. data change requests during a collaboration session for effecting changes to the
5. local copies of data for collaborative activities, the apparatus comprising:
6. data change request priority logic for inserting into each data change
7. request priority information that determines an order of execution of data change
8. requests; and
9. dependency collision resolution logic for inserting into selected data
10. change requests dependency information for resolving a dependency collision
11. between first and second data change requests which both depend for execution
12. on a third data change request.

1. 2. The apparatus of claim 1 wherein each of the collaborating computers and a user
2. of that collaborating computer are an endpoint and wherein the priority
3. information in a data change request comprises a sequence number generated
4. by an endpoint that generated that data change request.

1. 3. The apparatus of claim 1, wherein each of the collaborating computers and a
2. user of that collaborating computer are an endpoint and wherein the dependency
3. information in a data change request comprises characteristics of an endpoint
4. that originated that data change request for use in resolving dependency
5. collisions between that data change request and another data change request on
6. the basis of, at least in part, the endpoint characteristics.

1. 4. The apparatus of claim 1, wherein the dependency information comprises a type
2. of data change for use in resolving dependency collisions between a first data

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3		change request and a second data change request on the basis of, at least in
4		part, the data change type.

1	5.	The apparatus of claim 1, wherein the dependency information comprises a type
2		of activity for use in resolving dependency collisions between a first data change
3		request and a second data change request on the basis of, at least in part, the
4		activity type.

1	6.	The apparatus of claim 1, wherein each of the collaborating computers and a
2		user of that collaborating computer are an endpoint and wherein the dependency
3		information comprises:
4		an identification code for identifying data to which a first data change
5		request pertains;
6		endpoint information (endpoint 1) identifying an endpoint from which the
7		first data change request was generated;
8		a data change request sequence number (sequence number 1) for the
9		first data change request; and
10		information identifying an endpoint (endpoint 2) and a data change
11		request sequence number (sequence number 2) for a second data change
12		request on which the first data change request depends.

1	7.	The apparatus of claim 6, wherein the sequence number information and
2		dependency information are arranged in a data change request substantially in
3		the form:
4		sequence number 1 @ endpoint 1 : sequence number 2 @ endpoint 2.

1	8.	The apparatus of claim 1 wherein each data change request comprises a header
2		portion and a payload portion and wherein the data change request priority logic
3		comprises means for inserting the priority information into a header portion of a
4		data change request.

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1   9.   The apparatus of claim 1 wherein each data change request comprises a header

2   portion and a payload portion and wherein the dependency collision resolution

3   logic comprises means for inserting the dependency information into a header

4   portion of a data change request.

1   10.   The apparatus of claim 1 wherein each of the collaborating computers and a user

2   of that collaborating computer comprise a unique endpoint.

1   11.   The apparatus of claim 10 wherein the dependency collision resolution logic

2   comprises means for resolving a dependency collision between first and second

3   data change requests based on an order in which endpoints that generated the

4   first and second data change requests joined the collaboration session.

1   12.   A method for formatting data change requests in a peer-to-peer, activity-based

2   collaboration system having at least two collaborating computers, each with a

3   local copy of data thereon and wherein the collaborating computers exchange

4   data change requests during a collaboration session for effecting changes to the

5   local copies of data for collaborative activities, the method comprising:

6   (a)   inserting into each data change request priority information that

7   determines an order of execution of data change requests; and

8   (b)   inserting into selected data change requests dependency information for

9   resolving a dependency collision between first and second data change

10   requests which both depend for execution on a third data change request.

1   13.   The method of claim 12 wherein each of the collaborating computers and a user

2   of that collaborating computer are an endpoint and wherein the priority

3   information in a data change request comprises a sequence number generated

4   by an endpoint that generated that data change request.

1 14. The method of claim 12, wherein each of the collaborating computers and a user
2 of that collaborating computer are an endpoint and wherein the dependency
3 information in a data change request comprises characteristics of an endpoint
4 that originated that data change request for use in resolving dependency
5 collisions between that data change request and another data change request on
6 the basis of, at least in part, the endpoint characteristics.

1 15. The method of claim 12, wherein the dependency information comprises a type
2 of data change for use in resolving dependency collisions between a first data
3 change request and a second data change request on the basis of, at least in
4 part, the data change type.

1 16. The method of claim 12, wherein the dependency information comprises a type
2 of activity for use in resolving dependency collisions between a first data change
3 request and a second data change request on the basis of, at least in part, the
4 activity type.

1 17. The method of claim 12, wherein each of the collaborating computers and a user
2 of that collaborating computer are an endpoint and wherein the dependency
3 information comprises:
4 an identification code for identifying data to which a first data change
5 request pertains;
6 endpoint information (endpoint 1) identifying an endpoint from which the
7 first data change request was generated;
8 a data change request sequence number (sequence number 1) for the
9 first data change request; and
10 information identifying an endpoint (endpoint 2) and a data change
11 request sequence number (sequence number 2) for a second data change
12 request on which the first data change request depends.

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1   18.   The method of claim 17, wherein the sequence number information and

2   dependency information are arranged in a data change request substantially in

3   the form:

4   sequence number 1 @ endpoint 1 : sequence number 2 @ endpoint 2.

1   19.   The method of claim 12 wherein each data change request comprises a header

2   portion and a payload portion and wherein step (a) comprises inserting the

3   priority information into a header portion of a data change request.

1   20.   The method of claim 12 wherein each data change request comprises a header

2   portion and a payload portion and wherein step (b) comprises inserting the

3   dependency information into a header portion of a data change request.

1   21.   The method of claim 12 wherein each of the collaborating computers and a user

2   of that collaborating computer comprise a unique endpoint.

1   22.   The method of claim 21 wherein step (b) comprises resolving a dependency

2   collision between first and second data change requests based on an order in

3   which endpoints that generated the first and second data change requests joined

4   the collaboration session.

1   23.   A computer program product for formatting data change requests in a peer-to-

2   peer, activity-based collaboration system having at least two collaborating

3   computers, each with a local copy of data thereon and wherein the collaborating

4   computers exchange data change requests during a collaboration session for

5   effecting changes to the local copies of data for collaborative activities, the

6   computer program product comprising a computer usable medium having

7   computer readable program code thereon, including:

8   ·   program code for inserting into each data change request priority

9   information that determines an order of execution of data change requests; and

10   program code for inserting into selected data change requests

11   dependency information for resolving a dependency collision between first and

12   second data change requests which both depend for execution on a third data

13   change request.

1   24.   The computer program product of claim 23 wherein each of the collaborating

2   computers and a user of that collaborating computer are an endpoint and

3   wherein the priority information in a data change request comprises a sequence

4   number generated by an endpoint that generated that data change request.

1   25.   The computer program product of claim 23, wherein each of the collaborating

2   computers and a user of that collaborating computer are an endpoint and

3   wherein the dependency information in a data change request comprises

4   characteristics of an endpoint that originated that data change request for use in

5   resolving dependency collisions between that data change request and another

6   data change request on the basis of, at least in part, the endpoint characteristics.

1   26.   The computer program product of claim 23, wherein the dependency information

2   comprises a type of data change for use in resolving dependency collisions

3   between a first data change request and a second data change request on the

4   basis of, at least in part, the data change type.

1   27.   The computer program product of claim 23, wherein the dependency information

2   comprises a type of activity for use in resolving dependency collisions between a

3   first data change request and a second data change request on the basis of, at

4   least in part, the activity type.

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1   28.   The computer program product of claim 23, wherein each of the collaborating
2   computers and a user of that collaborating computer are an endpoint and
3   wherein the dependency information comprises:
4   an identification code for identifying data to which a first data change
5   request pertains;
6   endpoint information (endpoint 1) identifying an endpoint from which the
7   first data change request was generated;
8   a data change request sequence number (sequence number 1) for the
9   first data change request; and
10   information identifying an endpoint (endpoint 2) and a data change
11   request sequence number (sequence number 2) for a second data change
12   request on which the first data change request depends.

1   29.   The computer program product of claim 28, wherein the sequence number
2   information and dependency information are arranged in a data change request
3   substantially in the form:
4   sequence number 1 @ endpoint 1 : sequence number 2 @ endpoint 2.

1   30.   The computer program product of claim 23 wherein each data change request
2   comprises a header portion and a payload portion and wherein the program code
3   for inserting into each data change request priority information that determines
4   an order of execution of data change requests comprises program code for
5   inserting the priority information into a header portion of a data change request.

1   31.   The computer program product of claim 23 wherein each data change request
2   comprises a header portion and a payload portion and wherein the program code
3   for inserting into selected data change requests dependency information for
4   resolving a dependency collision comprises program code for inserting the
5   dependency information into a header portion of a data change request.

1 32. The computer program product of claim 23 wherein each of the collaborating
2   computers and a user of that collaborating computer comprise a unique endpoint.

1 33. The computer program product of claim 32 wherein the program code for
2   inserting into selected data change requests dependency information for
3   resolving a dependency collision comprises program code for resolving a
4   dependency collision between first and second data change requests based on
5   an·order in which endpoints that generated the first and second data change
6   requests joined the collaboration session.

1 34. A computer data signal embodied in a carrier wave for use in a peer-to-peer,
2   activity-based collaboration system having at least two collaborating computers,
3   each with a local copy of data thereon and wherein the collaborating computers
4   exchange data change requests during a collaboration session for effecting
5   changes to the local copies of data for collaborative activities, comprising:
6   a payload code comprising a data change request code for requesting an
7   identified data change comprising a first data change request, and a command
8   code for specifying at least one command for implementing the first data change
9   request; and
10   a header code comprising dependency collision resolution code.

1 35. The computer data signal of claim 34, wherein the dependency collision
2   resolution code comprises a recorded indication of telespace membership
3   sponsorship for use in resolving dependency collisions between the first data
4   change request and a second data change request on the basis of, at least in
5   part, telespace membership sponsorship.

1 36. The computer data signal of claim 34, wherein the dependency collision
2   resolution code comprises a recorded indication of characteristics of an endpoint
3   that originated the data change request for use in resolving dependency

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4		collisions between the first data change request and a second data change
5		request on the basis of, at least in part, the recorded indication of endpoint
6		characteristics.

1	37.	The computer data signal of claim 34, wherein the dependency collision
2		resolution code comprises a recorded indication of a type of data change for use
3		in resolving dependency collisions between the data change request and a
4		second data change request on the basis of, at least in part, the data change
5		type.

1	38.	The computer data signal of claim 34, wherein the dependency collision
2		resolution code comprises a recorded indication of type of activity for use in
3		resolving dependency collisions between the data change request and a second
4		data change request on the basis of, at least in part, the activity type.

1	39.	The computer data signal of claim 34, wherein each of the collaborating
2		computers and a user of that collaborating computer are an endpoint and
3		wherein the dependency collision resolution code comprises an identification
4		code for identifying data to which the data change request pertains, and a
5		consistency data code for identifying an endpoint and a data change request
6		sequence number for the first data change request, and for identifying an
7		endpoint and a data change request sequence number for a second data change
8		request on which the first data change request depends.

1	40.	The computer data signal of claim 39, wherein the consistency data code
2		identifies the endpoint and the data change request sequence number for the
3		first data change request, and identifies an endpoint and a data change request
4		sequence number for one data change request on which the first data change
5		request depends, said one data change request being the second data change
6		request.

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ABSTRACT OF THE DISCLOSURE

[130] A distributed, activity-based collaboration system employs a data change request priority scheme for determining an order of execution of data change requests in effecting changes to local copies of data so as to optimize data consistency for

5   collaborative activities. The data change request priority scheme can entail encoding sequence number information and dependency information in the data change requests, responsive to which data changes can be made, unmade and remade to the data.

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